



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

NOTES FOR STUDENTS.

IN TWO PAPERS⁵ Dr. Bessey states that some recent observations of his have lead him to think that the greater portion of the state of Nebraska is capable of supporting a tree vegetation. He claims that the absence of trees is due to the prairie fires, and that now wherever given a chance the tree area of the state is spreading.—H. N. WHITFORD.

ACCORDING TO MIYAKE⁶ the majority of the leaves of Japan evergreens are found to contain more or less starch in winter, only one third of the species being devoid of it altogether. The starch content in winter, however, is considerably decreased; this decrease begins in November, the minimum of starch is found in January, and the amount increases again in February. The author also shows that starch is actually manufactured in winter, though much less than in summer.—H. C. COWLES.

NEMEC asserts⁷ that in certain plant parts, *e. g.*, the root, where transmission of a stimulus occurs, there are embedded in a special plasma fibrils, the clusters of which, by proper staining, may be made easily visible with moderate magnification. These fascicles correspond on opposite sides of the partition walls and presumably are continuous or at least in contact through it. Experiment has shown that conduction of a stimulus is more rapid in the direction of these fibrils than across them, and that after their degeneration this difference in rate disappears. The perceptive region of the root, he declares, lies mostly in a special group of cells in the root cap. These are characterized by a very fluid plasma, and permanent starch grains which easily sink through it to rest on the ectoplasm. Fibrils extend from these cells to the region of curvature. In some roots this group of cells becomes a special organ, which may be compared in principle with the organs of equilibrium (vesicles with statoliths) in certain lower animals. (Cf. Noll, rev. in BOT. GAZ. 30: 134. 1900.)—C. R. B.

MR. JAMES A. TERRAS, of Edinburgh, has examined the conditions under which the winter buds of *Hydrocharis Morsus-ranae* germinate. This plant propagates itself by buds, formed at the extremities of the subaqueous runners, in which is stored an abundant supply of reserve proteid, apparently a fluid albumin. The autumnal buds separate as soon as mature and sink to the bottom, where they rest till the following spring, or longer if covered by mud to the depth of two or three centimeters. It seems that this cover is effective merely because it cuts off the light, any other opaque screen likewise preventing germination. Indeed if merely much shaded the buds do

⁵The forest and forest trees of Nebraska. Reprint from Report of Nebraska Board of Agriculture, pp. 79-102. 1899.

The natural spreading of timber areas. Forester 6: 240-243. 1900.

⁶ Bot. Mag. 14: 44-49. 1900.

⁷ Biologisches Centralblatt 20: 369. 1900.

not develop. Experiments with colored liquid screens show that yellow and orange rays are most efficient, as Heald found in studying the germination of moss and fern spores. Heat apart from light is incapable of inciting to development; and no supply of food, either carbohydrate or nitrogenous, awakens to activity. No zymogen was found in resting buds, and Terras concludes that the primary effect of light is to stimulate the protoplasts to activity, leading to the development of a zymogen, which in its turn is converted under the influence of the light into a zymase by which the utilization of the stored food becomes possible.—C. R. B.

IN HER RECENT WORK on *Lavatera*,⁸ Miss Byxbee describes a process of spindle development as follows: In the young pollen mother cells the cytoplasm consists of a fibrous network and a granular substance. As division approaches, the network surrounding the nucleus pulls out parallel to the membrane, forming a felt of fibers, and at the same time the granular substance of the cytoplasm collects in a wide dense zone about the nucleus. The nuclear wall now breaks down, and the fibers outside begin to grow into the nuclear cavity and mingle with the linin threads, which appear to have increased in quantity. This central mass of fibers now grows out into several projections, which become the cones of the multipolar spindle. Two of these cones become more prominent than the others, which they finally absorb, and the result is a bipolar spindle. Just how this absorption of the smaller cones is brought about is not made clear either in the description or in the figures.

The work is well illustrated by four beautiful lithographic plates. While the results differ in certain minor details from previous work on the subject, it confirms the more important points that have already been worked out in such forms as *Equisetum*, *Cobaea*, *Passiflora*, *Gladiolus*, etc. The paper is an addition to the very interesting series of contributions on spindle formation recently issued from the Botanical Laboratory of the University of California.

Flemming's strong solution, with an excess of acetic acid, palladium chlorid, and iridium chlorid, to which a small quantity of glacial acetic acid was added, were used for fixing; saffranin, gentian violet, and orange G were used for staining.—A. A. LAWSON.

THE GEOLOGICAL SURVEY of New Jersey has just issued a publication⁹ which contains some valuable information concerning the forests of that state. In this C. C. Vermeule discusses the physical conditions of the forests of the state, and gives some field notes on forest conditions Gifford Pinchot

⁸ BYXBEE, EDITH SUMNER: The development of the karyokinetic spindle in the pollen mother cells of *Lavatera*. *Cal. Acad. Sci. III. Bot.* 2: 63-81. *pls. 10-13*. 1900.

⁹ Annual Report of the State Geologist for 1899. Report on forests. *Geol. Surv. of New Jersey*, pp. ix+327, *pls. 21*, with *maps*. 1900.

writes on the effects of fire on forest production, and on the plains, and adds some silvicultural notes on the white cedar. The last two topics are incorporated in the present volume from former reports of the survey.

By far the most useful part of the report from an ecologic standpoint is a paper discussing the relation between forestry and geology, by Dr. Hollick. This is a revision of a paper of the same title published in the January and February (1899) numbers of the *American Naturalist*. It contains a discussion of the existing conditions of the forests and their historic development. The state is divided into coniferous, deciduous, and tension zones. The coniferous zone lies to the south, which has for the most part barren soil conditions. In better soil conditions in the north is the deciduous zone, and the tension zone lies between these. Dr. Hollick draws the conclusion that "the coniferous zone is destined to be ultimately obliterated, or only to exist over limited areas, often for the negative reason that in such areas the conditions may not be favorable for other types of vegetation."

In part three of the report John B. Smith treats of the rôle of insects in the forest; and part four contains an article by John Gifford on the forestal conditions and silvicultural prospects of the coastal plain of the state, with remarks in reference to other regions. Other valuable features of the report are a large number of half-tone reproductions from photographs, and maps showing geological formations, distribution of rainfall, and distribution of forest areas.—H. N. WHITFORD.

ITEMS OF TAXONOMIC INTEREST are as follows: C. H. BISSELL (Rhodora 2: 225. 1900) has described a new variety of *Zizia aurea* from Connecticut.—Two new genera of Hymenogasteres have been described recently: *Arcangeliella*, by F. CAVARA (Nouvo Giorn. Bot. Ital. 7: 117-128. pl. 7. 1900), from the coniferous forests of Vallombrosa, Etruria; and *Martellia*, by O. MATTIROLLO (Malpighia 14: 39-110. pl. 1. 1900), from Sicily.—L. PETRI (Malpighia 14: 111-139. pls. 2-4. 1900) has described a new genus of Gasteromycetes from Borneo, *Clathrogaster* by name.—H. T. A. HUS (Zoe 5: 61-70. 1900) has published a preliminary synopsis of the west coast species of *Porphyræ*, recognizing thirteen species and varieties, four of which are described as new.—S. B. PARISH (*idem*, 71-76) has begun a series of papers entitled "Contributions to Southern California Botany," the first containing new species or varieties under *Sphaeralcea*, *Gilia*, *Galium*, *Eupatorium*, and *Bidens*.—T. S. BRANDEGEE (*idem*, 78-79) has described a new species of *Tapirira* from Lower California.—MISS ALICE EASTWOOD (*idem*, 80-90) has described new Californian species under *Salix*, *Chrysopsis*, *Helianthella*, *Sphacele*, *Mimulus*, *Aphyllon*, *Asclepias*, *Cleomella*, *Peucedanum*, and *Navarretia*.—C. L. POLLARD (Proc. Biol. Soc. Washington 13: 184. 1900) has described a new *Helianthus* (*H. agrestis*) from Florida.—SCRIBNER and MERRILL (Division of Agrostoplogy, Circular 27, Dec. 4, 1900) have described

two new species of *Eatonia* from the southern states.—RUDOLPH SCHLECHTER (Mém. de l'Herb. Boiss. 21: 1-78. 15 N. 1900) has published a monograph of the *Podochilinae* (a group of orchids including four genera), much enlarging the borders of *Podochilus*, recognizing forty-seven species in it, and describing five as new; describing a new genus, *Lobogyne*; and recognizing six species in *Thelasis*, and two in *Oxyanthera*.—J. M. C.

MESSRS. D. H. SCOTT and T. G. HILL have published¹⁰ an account of the structure of *Isoetes Hystrix*, a terrestrial species, dealing entirely with the vegetative organs. Some of the results are as follows:

Stem.—There is some evidence of a single apical cell; the stele is not composed of united leaf traces, but is cauline, as in the simpler lycopods; two cambiums are developed, in some cases the outer, in other cases the inner first; well-differentiated phloem is always present in the intracambial zone, being continuous with the leaf traces.

Leaf.—The vascular bundle in the lamina has exarch structure, the protoxylem lying next the phloem; the phloem contains true sieve tubes with transverse and lateral sieve plates, on both of which callus is formed; growth is intercalary, except at first; the labium and velum are derived from tissue above the sporangium, and not from sterilized sporogenous tissue.

Root.—The stele has a monarch structure throughout, the differentiation of the xylem beginning with the development of a single tracheid; the apex is distinctly layered, the initial groups giving rise to plerome, and to inner and outer cortex.

In the conclusion of the paper the authors discuss the systematic position of the genus, presenting strong arguments in favor of its affinity with the Lycopodiales, in which group it seems to have some real affinity with *Selaginella*, but not close enough to include the two in the same family. "The relationship of *Isoetes* to the *Lepidodendreae* is probably a nearer one." The authors regard the genus as one reduced from a much more complex type, and in no sense a primitive form of the leafy sporophyte. They would regard it "as a group that has long hovered on the limit of terrestrial and aquatic life, some of the forms becoming wholly submerged, while a few have definitely betaken themselves to dry land, a large proportion leading a more or less amphibious existence."—J. M. C.

ONE OF THE greatest ecological investigations of the day has been delayed if not permanently checked by the untimely death of the brilliant young Scotch botanist, Robert Smith, of Dundee. Inspired largely by Flahault, he attempted to do for Scotland what the latter is doing for southern France, viz., make a detailed ecological survey of the country. Since 1896 Smith has worked unceasingly at his task, and had published but the

¹⁰ Annals of Botany 14: 413-454. pls. 23, 24. 1900.

first two installments¹¹ when death put an end to his labors. In 1894 Flahault conceived the idea of making an ecological map of France,¹² especially with regard to the forests and agricultural areas. In 1897 the first sheet, corresponding in a way to the topographic sheets of our national geological survey, was published.¹³ The maps are made on the scale of 1 : 200,000, and each plant association is represented by a given color. Flahault has adopted twenty-two conventional color tones, which also in a general way show the topographic relief, lowlands having light and highlands dark colors. Contour lines are used as on ordinary topographic sheets. Smith studied with Flahault at Montpellier and then turned his enthusiastic attention to his native country.

In 1899 Robert Smith published an interesting paper on the study of plant associations,¹⁴ in which was given a historical summary of plant society studies from Humboldt down to Warming and Flahault, together with suggestions for use in field work. The two sheets which the author published give evidence of the most careful work, and cause us to regret that we shall not soon see any more. The Edinburgh sheet deals largely with lowlands and hence with cultivated areas. The littoral vegetation consists of marsh, dune, and rock plants, all of which the author regards as halophytic. The dominating forest trees are oaks on the plains and hills, pines and birches on the mountains, and alders in the swamps, though but little natural forest remains. In the higher areas are many dry, medium, and wet heath associations. The North Perthshire sheet has to do with a mountainous district. The maps are finely executed in colors that show strong contrasts. In America no comprehensive work like that of Smith or Flahault has yet been done, though the excellent mapping of our forest reserves under Gannett's supervision, published in the nineteenth and twentieth annual reports of the director of the United States Geological survey, does a similar grade of work for the forests. Professor Geddes¹⁵ has given a very appreciative sketch of Robert Smith, which shows how his loss was felt at home.—H. C. COWLES.

THE CURIOUS PARASITIC *Balanophoraceæ* have always excited interest, but especially so since the appearance of the papers of Treub (1898) and Lotsy (1899) describing the strange ovulate organ and apogamous embryo of species of *Balanophora*. Our knowledge of the group has now been extended by a paper just published by Dr. Lotsy,¹⁶ in which he describes a species of

¹¹ SMITH, ROBERT: Botanical Survey of Scotland. I. Edinburgh District. II. North Perthshire District. Scot. Geog. Mag. 16: 385-416, 441-467. 1900.

¹² Bull. Soc. Bot. France 41: 56-94. 1894. ¹³ Annales de Geographie. 1897.

¹⁴ Nat. Sci. 14: 109-120. 1899. ¹⁵ Scot. Geog. Mag. 16: 597-599. 1900.

¹⁶ LOTSY, J. P.: *Rhopalocnemis phalloides* Jungh., a morphological-systematical study. Ann. Jard. Bot. Buitenzorg II. 2: 73-101. pls. 3-14. 1900.

Rhopalocnemis. The plant body is tuber-like, frequently as large as a man's head, is entirely devoid of even a trace of foliar organs, and is parasitic upon the roots of various trees. It seems to pass several years underground and comes to the surface but a short time before the development of flowers. The thick spicate flower clusters burst through the outer layers of the tuberous body, the individual flowers being well protected by peculiar peltate scales.

The carpellate flower consists of a syncarpous pistil, made up of two to five carpels, and inclosing a structure which Lotsy calls a free central placenta, and once, presumably by inadvertence, a nucellus. In any event, the structure is the enlarged tip of the axis of the flower, which soon completely fills the cavity of the ovary. At this stage one or more hypodermal cells of this axis tip enlarge, and without division are transformed into embryo sacs, one of which germinates in the usual way and passes through the ordinary ante-fertilization stages. The author regards this axial structure with its embryo sacs as a placenta without ovules; but, even aside from the fact that a placenta is nothing morphologically, the reviewer sees no reason for regarding the structure other than a terminal cauline ovule without integuments. A very large primary endosperm nucleus is formed in the usual way, but the author never observed a pollen tube, nor could he by repeated artificial pollination induce pollen tubes to develop. Under these circumstances *Balanophora* has learned to develop an embryo apogamously from the micropylar polar nucleus, but *Rhopalocnemis* is unable to do so, and hence has become practically a seedless plant. In just one case was Lotsy able to secure a few seeds, and even in them few stages of developing embryos were discovered, but enough to assure him that they had come from the egg, and probably a fertilized egg.

The staminate flowers are no less singular, each one consisting of a single structure which by courtesy may be called a stamen, but is probably a transformed axial structure. In its enlarged extremity numerous imbedded sporangia are developed, centrally as well as peripherally. These sporangia do not organize definite wall layers as in ordinary angiosperms, and have no method of dehiscence other than the breaking down of the superficial tissues. It would seem to be the rarest chance, therefore, if a pollen grain should ever reach a stigma, which in fact has usually lost all power of retaining pollen grains. The pollen grains are completely organized, and the two male cells appear, both of them finally assuming, along with the tube nucleus, an elongated, vermiform appearance, which according to Lotsy is merely preparatory to disorganization.

The twelve elaborate and handsomely colored plates present every detail observed, as well as the condition of the preparations. It is unfortunate that Dr. Lotsy writes in English, as his unfamiliarity with the language makes his

meaning a matter of inference rather than statement. While the well-informed English reader finally comes at his meaning, the paper must be baffling to the foreigner who is compelled to translate.—J. M. C.

PROFESSOR HARPER has given us a detailed description of the sexual reproduction of *Pyronema*.¹⁷ The account is of especial interest, for it presents another instance of the fusion of multinucleate gametes, and is an important corroboration of Stevens' studies on *Albugo bliti* with respect to the behavior of cytoplasm and nuclei under such conditions.

The oogonium of *Pyronema*, as is well known, puts forth a conjugation tube (trichogyne) whose tip fuses with the antheridium. The tube is separated from the oogonium by a cross wall before its fusion, and this septum is later absorbed, when the protoplasm from the antheridium passes into oogonium and fertilizes the latter structure.

The oogonium and antheridium are multinucleate from the start. The conjugation tube likewise contains many nuclei, but these break down before fertilization. The number of nuclei in the oogonium is variable but there may be as many as two hundred. These gather in the central region of the structure, forming a closely packed collection at the time of fertilization. A great many sperm nuclei enter the oogonium through the conjugation tube, but they are hardly likely to equal the female nuclei in number. The sperm nuclei are attracted to the central mass of female nuclei, and shortly afterwards are found fusing in pairs with these elements. Some nuclei are always left over unmated, and these may be recognized for a long time by their smaller size. There is evidence that they finally break down.

The ascogenous hyphae spring directly from the fertilized oogonium, and as they develop the oogonium becomes rapidly emptied of its protoplasm and is finally left as a hollow cyst. The development of the asci is not essentially different from *Peziza*, *Ascobolus*, *Erysiphe*, and other types. The young ascus is the second cell of a curved branch. It contains two nuclei that fuse, and these are not sister nuclei. The fusion nucleus gives rise by successive mitoses to eight nuclei accompanied by the beautiful asters that Harper has described for several other forms, and the ascospores are cut out of the cytoplasm by these asters in the characteristic manner.

The ascocarp of *Pyronema* is a compound structure involving several systems of ascogenous hyphae from as many fertilized oogonia. The elements become so mixed that it is impossible to separate them. However, the ascogenous hyphae may be readily distinguished from the vegetative mycelium that forms the envelop of the ascocarp and the paraphyses in the hymenium. Harper points out that the characters most distinctive of the ascogenous hyphae are large nuclei, many times larger than those of the vegetative mycelium.

¹⁷ HARPER, R. A.: Sexual reproduction in *Pyronema confluens* and the morphology of the ascocarp. *Ann. of Bot.* 14: 321. *pls.* 19-21. 1900.

This study of *Pyronema* has important bearings in various directions and these are discussed at length. Along the lines of Harper's previous studies they serve to clinch more strongly his argument, supporting the views of De Bary, that the Ascomycetes have sexual organs. Indeed the opinions of Van Tieghem, Brefeld, and Dangeard seem to have passed below the horizon of the present day outlook, so conclusive is the evidence presented from work in various fields, among the lichens, the Laboulbeniales, the Perisporiales, and the Pezizales.

Pyronema is of especial interest because it presents characters somewhat intermediate between the simple fusion of the antheridium and oogonium in *Sphaerotheca*, and the complex apparatus with the trichogyne found in the lichens and Laboulbeniales. Still it is very remarkable that such diverse conditions should appear in a single group, and the question seems very fair whether or not the Ascomycetes are a phylogenetic unit. However, the trend of investigation indicates complexities in life histories as well as structures among the fungi far greater than were at first imagined, and it is quite possible that widely different results may have quickly arisen under the pressure of peculiar life conditions.

The study of multinucleate gametes has opened an interesting line of investigation, and promises results that may materially modify our views of the evolution and differentiation of sexual organs among the Phycomycetes, and perhaps the Ascomycetes.—B. M. DAVIS.

IN A RECENT PAPER Wager gives an interesting account of his observations on *Euglena viridis* as they bear on the functions and relations of the eye spot and flagellum. After a brief résumé of the general morphology of the cell he takes up the vacuole system and gullet. He states definitely that, contrary to previous observations, the principal vacuole opens directly into the gullet, and therefore is an excretory reservoir. Just at this point Wager takes issue with the zoologists' claim of holozoic nutrition. Using powdered carmine in the culture medium he failed to find a single grain entering the gullet. He also brings forward tentatively Kawkin's explanation that the gullet is an absorptive region because paramylum grains are smallest in close proximity to it. Wager's views on the structure of the eye spot antagonize some older ideas and support others. In brief, the eye spot is composed of granules, bright red in color, imbedded in plasmatic network. The granules are in a single layer and with no regular arrangement. On treatment with alcohol, a reaction similar to that of disintegrating chlorophyll grains is obtained; hence the eye spot coloration is a derivative from chlorophyll. The origin of the spot *de novo* is in doubt. The flagellum and its close physical connection with the eye spot takes up the next paragraph. Nothing is known of its mechanism, however. Its structure is simple; a single filament with bifurcate base, bearing a swelling on one of the bifurcations. The

base is attached to the posterior side of the excretory reservoir. The swelling mentioned lies against and below the concave side of the eye spot. This fact leads to a consideration of the effect of light on *Euglena*. As is the case in all motile cells, strong light repels and a moderate light attracts. A bright light will cause the active cells to round up and encyst, if the stimulation be continued for several days. In darkness the cells round up, lose flagella, and divide. In spectrum rays, over seventy per cent. are drawn into the green-blue field. These blue rays are those absorbed by the red eye spot. As to the function of the eye spot, Wager makes two suggestions. First, that the absorbed blue rays stimulate the eye spot, which in turn stimulates the swelling on the flagellum; second, that by cutting off certain rays, the eye spot produces a definitely unequal illumination of the enlargement, and as a result, an attempt at orientation. Both hypotheses, however, he puts forward tentatively, subject to further and more careful investigation.—PHILIP G. WRIGHTSON.

R. A. ROBERTSON (Trans. and Proc. Bot. Soc. Edinburgh 21: 290-298, *pls.* 3. 1900) has recorded and illustrated some interesting observations on variations in *Lycopodium clavatum*. A luxuriant patch of this plant growing in a wood became exposed by a great storm which removed nearly every tree, and upon 20 to 30 per cent. of the erect axes the observed variations were found. Of this varying material 87 per cent. had extra branching of the strobilus-bearing axes, 66 per cent. showed branching of the strobili, and in 9 per cent. the strobili were completely metamorphosed into leafy shoots. The author suggests that these variations are of interest in reference to the phylogeny of the Lycopodiales, the branching of the strobilus and the sterilization of sporogenous tissue being supposed to have played a part in the evolution of the group.—J. M. C.

THE LITERATURE of lenticels has been further supplemented by James A. Terras (Trans. and Proc. Bot. Soc. Edinburgh 21: 341-352, *pls.* 2. 1900), who has written upon the relation between the lenticels and adventitious roots of *Solanum Dulcamara*. He concludes that these roots do not arise below or grow out through lenticels, as is apparently the case in the majority of plants, but that their origin is entirely independent of the formation of lenticels. Furthermore, he states that the protuberances on the surface of the stem are not lenticels, but result from the formation of a mass of secondary tissue which originates in the reaction of the phellogen to the pressure set up by the elongating root below it. The lenticels only appear after the protuberances are fully formed.—J. M. C.